DOCUMENT RESUME

ED 389 886 CE 070 370

TITLE	The National Job Analysis Study. A Project to Identify Cross-Occupational Skills Related to High-Performance Workplaces.
INSTITUTION	American Coll. Testing Program, Iowa City, Iowa.
SPONS AGENCY	Employment and Training Administration (DOL), Washington, D.C.; National Center for Education Statistics (ED), Washington, DC.
PUB DATE	Nov 95
NOTE	27p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Basic Skills; Data Analysis; Educational Research; Employment Potential; Entry Workers; *Job Analysis; *Job Skills; Labor Force Development; *Occupational Information; Postsecondary Education; Secondary Education; Vocational Education

ABSTRACT

The National Job Analysis Study (NJAS) originated from the work of the Secretary's Commission on Achieving Necessary Skills and was designed to provide research necessary to identify and establish a taxonomy of workplace skills. Phase 1 identified an initial set of core behaviors common across occupations. The process began by identifying task statements from databases containing occupational information and determining the statements' degree of commonality. Translated behaviors and added illustrative behaviors were compiled into two versions of survey 1. The survey was distributed to 12,000 job incumbents in 6,000 organizations across the country. Over 160 occupations were sampled. Data analysis of returned surveys identified the work activities considered "core" behaviors. Phase 2 will cross-validate core behaviors and establish the relationship between the behaviors and job tenure. The core set of behaviors that result from survey 2 will be used as initial content for developing Behaviorally Anchored Rating Scales (BARS). A concurrent project has identified an initial set of 36 high-performance characteristics. Eight characteristics emerged that were considered essential. A thorough electronic literature search is planned to develop or choose workplace assessments based on results of the NJAS/BARS. The NJAS information will make it possible to develop occupational clusters and skill profiles and facilitate worker transitions from one job to another. (YLB)

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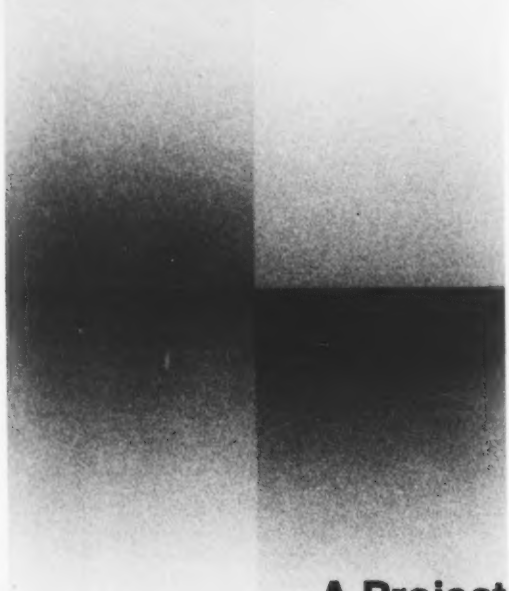

A Project to Identify Cross-Occupational Skills Related to High-Performance Workplaces

November 1995

U.S. DEPARTMENT OF EDUCATION
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The National Job Analysis Study

A Project to Identify Cross-Occupational Skills Related to High-Performance Workplaces

Funded by:
The U.S. Department of Labor,
Employment and Training Administration,
Office of Policy and Research

The U.S. Department of Education,
National Center for Education Statistics

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I. EXECUTIVE SUMMARY

It was not long ago when workers could easily enter the job market. However, starting within recent decades, as the economy and businesses began adapting to advanced technology and expanding global markets, an imbalance developed between the skills and competencies students were acquiring and the skills and competencies businesses were demanding. This gap has continued to widen, impeding the attainment of meaningful employment for workers and hindering the success and expansion of business.

In the effort to find solutions to this problem and address the needs of students and workers, education and business, the U.S. Departments of Labor and Education and the Office of Personnel Management formed a partnership to develop assessment measures of workforce competencies and skills as they were defined by the Secretary's Commission on Achieving Necessary Skills (SCANS). The purpose of the assessment measures is to provide data about the skills of America's current workforce and about the skills individual workers need for our nation to aggressively compete in the global economy. However, because of the great consequences to individuals, and to the nation as a whole, it became essential to first know and understand the basic elements before the assessment tools were developed. What are the skills and competencies that workers need in order to secure and perform the complex jobs of today's and tomorrow's ever-changing economy?

Sponsored by the U.S. Department of Labor, Employment and Training Administration, Office of Policy and Research and the U.S. Department of Education, National Center for Education Statistics, the National Job Analysis Study (NJAS) addresses this question by providing the research necessary to empirically identify and establish a taxonomy of workplace skills.

It is generally accepted that with an ever-changing workplace, America's workers must have the ability to move from one specific job with its unique demands to a totally different job with its demands. Critical for this new workforce are the "cross-occupational" skills. These are the skills that the NJAS must identify, those that are common across all occupations and necessary for worker and business success, particularly in high-performance settings. The outcomes of the NJAS will then guide the development of sound assessment instruments and establish the foundation for continuous and effective upgrading of educational and training curricula.

Background

The National Job Analysis Study originated from the work of the Secretary's Commission on Achieving Necessary Skills (SCANS), which had been the most recent large-scale project to identify cross-occupational competencies. When SCANS convened in 1990, its purpose was to determine the skills American workers need for job success in a global market and to create a plan of action to make sure those skills are developed by all citizens. The competencies and foundation, or basic, skills that resulted from SCANS were intended to set the agenda for what students would be taught in the nation's schools and how workers would be trained and retrained for the advanced jobs of the future. When ACT was awarded the contract to develop the assessment phase of the SCANS competencies, quantitative research became essential to validate the cross-occupational skills taxonomy and definition of high-performance workplaces. This research, in the form of the NJAS, ensures a sound basis for developing assessment instruments as well as the eventual informing of educational and training curricula.

To establish this foundation of research, the NJAS is designed with two phases. Phase 1 of the project includes the administration and analysis of Survey 1 of the NJAS to determine an initial set of core behaviors and a concurrent, collaborative project to identify an initial set of characteristics of high-performance workplaces (HPWP).

Phase 2 of the NJAS includes the administration and analysis of Survey 2, which will be comprised of the initial set of behavioral items determined by Survey 1 analysis. From the outcomes of Survey 2, the Behaviorally-Anchored Rating Scales (BARS) instrumentation will be developed, which will directly inform the construction of the test blueprint for the assessment instruments. Phase 2 will also include the development of items to validate the test blueprint established through the BARS as well as the further development of a high-performance workplace instrument to establish the presence and identity of high-performance characteristics within business organizations.

Phase 1

The first phase of the NJAS was recently conducted and identified an initial set of core behaviors that are common across occupations. Using several established criteria, the process started with ACT's research team pulling task statements from databases containing occupational information and determining the statements' degree of commonality. These task statements were then translated into a common language and level of specificity, also according to set criteria. The translated behaviors as well as illustrative behaviors developed from the SCANS competencies

and other NJAS-associated projects were compiled into two versions of Survey 1—Forms A and B—each containing half of the 214 survey items. In accordance with sampling criteria determined by experts in ACT's Research Division, the survey was distributed to 12,000 job incumbents in 6,000 organizations across the country. Over 160 occupations were sampled. The survey asked job incumbents to rate each behavior in terms of how important it is to the job and how frequently it is performed. The surveys were distributed using a comprehensive mailing plan, with postcard reminders and follow-up telephone calls to encourage participation.

For the returned surveys, data analysis produced an overall rating of criticality for each behavior. Next, a panel of experts reviewed the results and determined a cut score, and ACT researchers selected out highly correlated items, determining the final set of behaviors most common and important across the occupations sampled. Because of the great importance and potential impact of these behaviors on education and workplace training, ACT will proceed with Phase 2 of the NJAS to further evaluate these behaviors prior to the start of developing the assessment instruments.

Phase 2

The purpose of Phase 2 is to cross-validate the initial set of core behaviors identified from the first survey, establish the relationship between the behaviors and job tenure, and set proficiency levels for the behaviors with associated knowledge, skills, and abilities. Covering the same set of occupations, ACT will send Survey 2 to a new sample of 6,000 job incumbents in 3,000 organizations. Survey 2 will include the set of core behaviors identified from the first survey, the same importance and frequency rating scales, and an additional rating scale in which job incumbents will indicate when each behavior is needed on the job (e.g., at entry, after 6 months). This phase will generate preliminary data on the relationships among the behaviors, and data analysis will sort the core behaviors into similar groups.

Content experts will then participate in a structured process to develop the Behaviorally-Anchored Rating Scales (BARS) (Smith & Kendall, 1963), including the corresponding proficiency levels and associated knowledge, skills, and abilities (KSAs) for each level. The BARS will form the basis for constructing the assessment instruments and will be employed to identify the levels of behaviors and KSAs that are necessary in high-performance workplaces. Once the instruments are validated in a representative cross-occupational sample study, they will be used to obtain an estimate of the degree to which the workforce has acquired the necessary behaviors, skills, knowledge, and abilities. The BARS system will also be useful in developing skill requirements for particular jobs, informing occupational classification initiatives, and guiding educators and trainers in curriculum development.

High-Performance Characteristics

Essential to the identification of the behaviors and KSAs necessary in high-performance workplaces is the standard definition of "high performance." It is agreed by business leaders, educators, and policymakers that high-performance business practices are a key element in the continued economic well-being of our country. However, a lack of broad empirical data on the specific characteristics of high-performance workplaces has limited organizations striving to make the transition.

To meet the need for a conclusive definition of high-performance, an additional project is being carried out in conjunction with the NJAS. Conducted with collaboration from the National Alliance of Business (NAB) and the U.S. Department of Labor Office of the American Workplace (OAW), the first phase of this project identified an initial set of 36 high-performance characteristics. These characteristics will guide the further development of a common language and research of such workplaces and will form the basis for a new survey to establish the presence and identity of high performance in American businesses. During the cross-occupational validation of the BARS from the NJAS, ACT will develop and administer a high-performance workplace survey to be sent to business executives participating in the NJAS in order to further evaluate the 36 high-performance characteristics, identify workplaces that use "high-performance" practices, and relate those practices to the cross-occupational behaviors of the NJAS. With information from this study, organizations will have a guide to help them make the changes necessary for creating a high-performance environment.

Outcomes

Through empirical data from the NJAS and HPWP surveys, the work activities that are critical in the most competitive business environments in the nation will be identified. This will be the foundation for a system of job profiles, anchored by the behavioral information from the NJAS, to connect the demands of globally competitive jobs with the lessons taught to all learners. Specific occupational skills and standards will be linked to a series of broader sets of underlying skills (e.g., critical-thinking, problem-solving) that can be taught throughout the school years. By systematically linking these skills to the demands of our most competitive workplaces and incorporating them into a full educational experience, students and workers will begin to develop the necessary skills to become productive citizens in a global marketplace.

Throughout the development and implementation of the NJAS, the SCANS competencies and foundation skills and the content of the Workplace Literacy Test (WLT) are evident. Therefore, the outcomes of the NJAS, BARS, and the HPWP offer an opportunity to review the contents of SCANS and the WLT in terms of their

importance and applicability to the workplace, particularly within high-performance workplaces. Specific NJAS behaviors have been cross-walked to the SCANS competencies and to the content of the WLT. In most cases, several NJAS behaviors were necessary to cover the broad content areas of SCANS and the WLT. Through analysis of these behaviors, a valid estimate is possible for each SCANS competency and foundation skill and each WLT-related skill. The BARS development will further the opportunity to review the taxonomy of SCANS and the WLT by establishing an empirically-based organizational structure for comparison to both SCANS and the WLT. The HPWP survey will then frame this review within the content of high-performance organizations.

ACT is also working with the Department of Labor-funded Dictionary of Occupational Titles Reinvention Project (O*NET). By supplying the outcomes of the NJAS, ACT will be able to provide the O*NET project with validated work skills and activities to ensure that a common language of occupational information is developed concurrently. A common language system will provide the vehicle for assisting new, transitional, or displaced workers in making effective job-match choices. When occupations and their requirements are described in the same language, it becomes viable to match the skills of the workforce with the job requirements, thereby making better employment decisions possible.

II. PHASE 1 OF THE NJAS

To analyze the core job behaviors that will form the basis for a workplace skills assessment, ACT has designed a plan based on the experience of job analysis experts both within and outside of ACT. The National Job Analysis Study makes efficient use of resident experts in job analysis, sampling, survey design, survey administration, data entry, data analysis, and psychometrics. To bring an even broader expertise to the project, ACT is also working with outside consultants and a panel of experts in the areas of job analysis, work skills, and education who play an active role in the development and review of materials. The NJAS is designed to ensure that the outcomes withstand the most stringent scientific scrutiny and meet the needs of the overall assessment project.

Methodology and Development

Considering the goals of the study, the first process of the NJAS was to select the methods for analyzing jobs, collecting data, and developing a representative sample of workers. This study requires a job analysis method that is feasible and suitable for the multiple uses of the results. There are at least four general approaches to job analysis: logical analysis, direct observation, task inventories, and the critical incident technique (Kane, Kingsbury, Colton, & Estes, 1986). Because of the large scope of this study, ACT selected logical analysis and a survey approach for the task inventory.

The NJAS focus is on job, or work-oriented, behaviors. Once these behaviors are identified, it is feasible to determine the requisite knowledge, skills, abilities, etc. But in contrast to the more traditional task-based job analysis approach, the NJAS seeks to identify cross-occupational rather than job-specific work behaviors. As such, the study involves developing behavior statements that are generalizable across occupations. These common, or generic, behaviors are derived from task statements contained in job analysis information databases, from the SCANS competencies and foundation skills, and the Workplace Literacy Test.

As a starting point, project staff conducted a search of ACT's RAVE (Realistic Assessment of Vocational Experiences) database, which contains information from the more than 12,000 jobs in the DOT updated through 1991. The information in the database was electronically queried on the basis of key words to locate task statements containing those words. The search began with the use of 157 action verbs identified by Gael (1983, p. 60) as ones frequently included in task statements. Other verbs were added as appropriate.

Project staff also conducted an additional search in the database of job analysis information developed in 1992 for the Fort Worth, Texas, Independent School District and Chamber of Commerce. This database contains task statements from approximately 230 jobs in the Fort Worth area. These statements, which are coded by DOT codes, were compared to those contained in the RAVE database to ensure that the job analysis information for Survey 1 is as current and comprehensive as possible. Other databases, such as the one developed by the U.S. Office of Personnel Management (OPM), were also consulted to ensure comprehensiveness.

After the common job task statements were identified, ACT staff reviewed the task statement clusters for meaning and level of specificity. ACT staff translated the statements into common, or generic, behaviors written in a common language and at an appropriate level of specificity. The iterative process developed by ACT for writing the behavior statements includes the following steps:

- Group task statements by similarity of verbs.
- Group task statements by similarity of verb objects.
- Group task statements by similarity of outcomes.
- Group task statements by similarity of knowledge or physical skills required.
- Write behavior statements for task groups.

After the sample task statement groups were translated, ACT staff reviewed the behavior statements for overlap, combining or eliminating statements as necessary. The statements were then edited to simplify the language as much as possible.

The next step involved a meeting with ACT staff and the panel of job analysis experts. Using a modified Delphi technique, the meeting continued until a consensus was reached among all members of the panel as to the appropriate level of specificity in which to write all behavior statements (Gael, 1983; 1988).

Once consensus was obtained, ACT staff developed and refined the behavior statements for all task groups, consulting experts in the corresponding occupations as needed. SCANS and other sources of generalized behaviors were compared to the content of the task-group behaviors. When gaps were discovered, the relevant illustrative behaviors were added. The panel of experts then reviewed the full list of behavior statements to ensure that they reflected commonality of language and the level of specificity agreed upon through the consensus process. The panel also evaluated the behavior statements for content and comprehensiveness, expression in behavioral terms, and reading level, which must be easily understandable for a vast majority of job incumbents. Behavior statements were revised or added as necessary before being compiled for Survey 1.

The final 214 behavior statements reflected the level of specificity determined by the panel of experts. These items were placed randomly on the two survey forms rather than grouped by statement type to ensure that each item was evaluated independently from similar items. A rating scale of importance and frequency was also included for each survey statement, and a blank section was provided so that job incumbents could list other general tasks they pèrform that were not included in the survey. Survey 1 also contained demographic statements on factors such as time on the job, job title, wage, gender, ethnicity, and age. The specific list was developed by ACT in conference with the project consultants and panel of experts.

Sampling Frame

Because the intent of this study is to identify behaviors that are common across jobs, the selection of occupations to be sampled is critical. It would have been prohibitive and unnecessary to include the more than 12,000 occupations covered in the DOT. However, the sample must be representative of the total set of occupations so that the results of the study are valid.

ACT based the selection of a representative set of occupations on three criteria that, together, were most likely to yield an adequate sample from which to generalize to most occupations in the country. The three criteria are:

- Commonality. ACT selected occupations that as a group employ 80 percent of workers as counted by the Occupational Employment Statistics (OES) system. This ensures that the behaviors identified in the study are performed by a substantial majority of the workforce. The sample should be large enough to provide stable estimates regarding the behaviors in question.

- Representativeness Across Occupations. The sample for this study covers the full range of occupations regardless of the relative size of occupational families. ACT chose representativeness as a criterion to ensure that the sample was not restricted to a narrow set of occupations that employ large numbers of people. ACT used its "World-of-Work Map" (Prediger, 1976) to analyze the set of occupations selected by the first criterion and added occupations in areas that were proportionally underrepresented.

- Growth. ACT selected occupations that are expected to grow most rapidly in the next decade. The sample included the 25 occupations with more than 100,000 workers that are expected to experience the most real growth. When these occupations were not part of the sample derived from the first two criteria, they were added.

ACT's selection process for the occupational sample is iterative. The first criterion generated 140 occupations. This set was compared to the job families on the "World-of-Work Map" and to the list of the 25 fastest-growing occupations. The resulting sample of 164 contained the top 25 growth occupations, and at least one occupation in each of the 23 job families on the "World-of-Work Map." This representativeness indicated that the set of occupations is well distributed and, therefore, taps the breadth of skills that would represent all aspects of the labor market.

Optimally, the sampling frame would take a random selection of people in these occupations, but, to ACT's knowledge, no database of employees/occupations exists. Thus, it was necessary to contact the employees through the businesses at which they work. This was done by identifying the types of businesses at which it is likely that a person in the target occupation would be working. This was done using the crosswalk of the SIC (Standard Industrial Classification) codes and OES codes that are available through an Industry to Occupation (IO) matrix. This crosswalk identified the types of industries to be sampled. To adjust for the fact that some businesses would be much larger than others, therefore giving different probabilities of selection for the people in the target occupation, ACT used the procedure known as Selection with Probability Proportional to Size. In this procedure, the businesses' chance for inclusion in the sample is proportional to how many employees they have. It should be noted that a slightly better selection method could have been to sample proportional to the number of people in the target occupation who work within a particular firm, however, this information was not available. Once the types of businesses were identified, ACT gathered the necessary information on the number, size, and mailing address of businesses from within the particular SIC code that was identified. In the information packet sent with Survey 1, ACT asked the identified business to select two people in the target occupation. The sampling within the type of business was implicitly stratified by region using the zip code.

One expected difficulty from this method was that the identified business would not have a person in the targeted occupation. Anticipating this problem, the target business was given more than one job classification. ACT listed the target occupation at the top and below added four other occupations that a business in that SIC code should likely employ. The four other occupations were chosen randomly from those occupations that are common within that SIC code (and were to be included in the study). The instructions to the business then specifically stated that a person should be chosen from within the occupation listed at the top if possible, and, if there is no one from that occupation in the business, to select from the next one down on the list, etc. ACT understood beforehand that the matches between the type of firm (as given by SIC code) and occupation would be problematic; the above modification allowed a better chance of finding an employee in a targeted job classification.

Methods to Increase Response

As with all surveys, the rate of response from the sample is extremely important. To ensure that sufficient numbers of respondents were available for reliable results, ACT used the following methods:

- The surveys for Phase 1 were constructed so that they could be completed in a manageable time period. Based on past job analysis studies, ACT considered 30 minutes to be the maximum time burden on job incumbents.

- Job incumbents should be motivated to complete the survey because they were being asked to participate by someone of higher authority in their organization and must return the survey to that person for mailing to ACT. To entrust confidentiality, each respondent would insert the completed survey into an envelope, seal it, and write his or her first name across the seal before returning it to the contact person.

- ACT used a comprehensive mailing system that had been successful for other large-scale ACT survey projects. Follow-up telephone calls and postcard reminders were directed to nonrespondents, specifically the contact persons who were ultimately responsible for the return of surveys from their organizations.

Survey Administration

The first mailing letter announced the upcoming study and asked the contact person's organization to participate. This mailing also included a summary describing the purpose and methodology of the study. Approximately two weeks later, the contact persons received survey packets for the job incumbent respondents and a letter further describing the study and outlining the procedures the contact persons should follow. The contact persons were responsible for distributing the survey packets to the incumbents and ensuring their return. The packets for incumbents included the survey and a letter explaining the importance of the study and expressing appreciation for their participation. The letter assured the confidentiality of the study and provided specific instructions for returning the completed survey to the contact person. The contact persons were provided a postage-paid envelope to return the surveys to ACT.

After the survey packets were mailed, a postcard was sent to the contact persons who had not yet returned Survey 1. The postcard reminded the contact persons to promptly return the survey and reemphasized the importance of the study. Telephone calls were placed to nonrespondents urging them to participate and were

used to determine whether there would be any systematic bias that would affect the results of the study. Additional survey packets were sent to the contact persons who agreed over the phone to have a packet resent. This survey packet also contained a letter restating the importance of the study and outlining the contact person's responsibilities for survey collection.

In preparation for the returned surveys, quality control procedures were implemented at all steps of data entry and analyses. The data was entered into a large database at ACT and coded by OES codes. The data entry process was checked by ACT staff to verify the accuracy of this process. ACT staff implemented standard procedures for maintaining the confidentiality and security of all completed forms and other data.

Survey 1 Outcomes

Over 3,000 workers from 1,600 organizations took part in the initial survey. Of the occupations represented, secretaries returned the largest number of surveys (191), followed by registered nurses (115), college faculty (100), secondary school teachers (98), and bookkeeping/accounting clerks (92). Respondents also included engineers, postal carriers, salespersons, education administrators, librarians, bank tellers, auto mechanics, freight movers, machine operators, and police officers, among others.

Descriptive statistics were computed on both the importance and frequency ratings for items in Survey 1. Criticality—a multiplicative composite index of importance x frequency—was calculated on the raw importance and raw frequency ratings. The means and standard deviations associated with this composite index were used to help determine the core set of behaviors across the jobs surveyed. Following analyses, all behaviors from Survey 1 were rank-ordered on the basis of their criticality.

Results show that listening to the concerns of clients/customers and responding received the highest mark for the importance of the activity and the frequency it was performed (criticality mean [cm] 37.62). This activity was also listed by 82 percent of the respondents who perform this activity as part of their jobs.

Also receiving attention were: the ability to use a computer to locate, process, or communicate information (cm 36.19, 60%); safeguarding information and valuables (cm 36.15, 57%); scheduling work activities for oneself (cm 36.09, 80%); providing information to people (cm 34.98, 85%); determining the priority of work activities (cm 34.88, 76%); working with people in other departments to accomplish work (cm 33.69,

85%); judging the importance, quality, and accuracy of information (cm 32.88, 70%); coordinating own work activities with the activities of others (cm 32.46, 81%); and listening to instructions from or concerns of supervisors or co-workers and responding (cm 31.98, 86%).

These results are preliminary, pending validation in Phase 2.

Outcome Analysis

Through the deliberations of the panel of experts, a qualitative method was established to identify the cut score for the "core" behaviors. Initial cuts clearly indicated behaviors to keep, those with high criticalities, and behaviors to drop, those with low criticalities. However, this left the median scores for interpretation and discussion by the panel of experts in order to establish a final cut score. Each member of the panel was asked to establish a cut score for the remaining behaviors. To be inclusive rather than exclusive, the experts considered the lowest cut score possible for including the behavior. Panel members met to discuss their decisions, and a consensus was reached.

Attention was also given to the written comments of the job incumbents who completed the survey. Approximately 18 percent returned the survey with written comments. Of that 18%, approximately half concerned the respondents difficulty in interpreting the survey items, feeling that the work activities were too vague or not easily applicable to their specific occupation. Other noted comments felt that the items were repetitive and the survey too long for thoughtful completion within the estimated 30 minutes.

Given that the purpose of the NJAS is to identify cross-occupational skills using common descriptions of the activities, and the fact that this is an unfamiliar purpose and survey, it was anticipated that incumbents would have some difficulty interpreting the survey items and their intent. However, ACT was concerned about the time burden and redundancy. Therefore, ACT felt it necessary to further analyze the survey data in the effort to trim the remaining items to lessen the time burden for the Phase 2 survey. No item limit was set, cuts were to be made based on analysis and consensus.

From this point, ACT researchers correlated the items on each form. Because there were two forms, A and B, of Survey 1, this procedure could only analyze the items that were on the same form. Items with high correlations were identified for discussion with the options of keeping both items, editing the items to increase or decrease specificity in response to the correlation, or eliminating one item in favor of the other based on the correlation and other data.

ACT researchers then reviewed across forms for similar or redundant items based on one-to-one comparison and corresponding data. As in the above procedure, three options were considered.

From the initial survey items, analysis identified the work activities that are considered the "core" behaviors. These final items are prepared for Phase 2 validation.

III. PHASE 2 OF THE NJAS

The first step in Phase 2 is to develop a second survey consisting of the core behaviors identified in Phase 1. One key function of the second survey is to validate the outcomes of Survey 1. This cross-validation will help to ensure that these core behaviors are in fact critical in the workplace. Another function is to directly provide information for the development of the Behaviorally-Anchored Rating Scales (BARS).

The format of Survey 2 will be modified to a small extent, including another rating scale. In addition to the importance and frequency scales used in Survey 1, Survey 2 will add a need scale for incumbents to assess when each behavior is needed on the job. This scale will provide valuable information concerning when the behaviors are important: at entry into a job, within the first year on the job, and one or more years after starting the job. The behaviors will then be sequenced on the basis of need, providing ACT staff with a logical approach for developing the BARS that target specific behaviors necessary at different points of time on a job.

Outcomes of Survey 2

The first analysis of Survey 2 will duplicate the procedures used with Survey 1. It is expected that the results at this phase in the NJAS will not reveal any prominent differences, thus validating the outcomes of Phase 1. If differences are evident, changes will be made accordingly to the final list of behaviors. The final analyses of Survey 2 will consist of procedures, such as cluster analysis, that will be used to group the behaviors into domains as the first step in developing an initial structure for the BARS. The analyses at this point are not intended as terminal, but are intended to offer an empirically based body of information for a committee of experts to form the final taxonomy.

Development of BARS Instrumentation from NJAS Survey 2 Outcomes

ACT researchers will take the core set of behaviors that result from Survey 2 as the initial content for developing the BARS, which will provide a graphical method for scaling descriptions of behaviors along a hierarchical continuum ranging from low to high. This type of rating scale format is often used in taxonomic development to order content along a continuum and to provide more extensive operational definitions of domains. The BARS provide the methodology for scaling the behaviors from the NJAS Survey 2 according to complexity and to the knowledge, skills, and abilities (KSAs) required for the behavioral descriptions.

Subject matter experts will use the behaviors from Survey 2 to develop definitions for the anchor points on the scale. The anchor points for the domains will guide the experts in developing descriptions of proficiency levels based on the behaviors exhibited at the scale levels and the underlying KSAs. Accompanying skills-based literature will also assist experts in this process. Successful performance at a given proficiency level on the scale indicates mastery of the behaviors and KSAs associated with that level and with lower levels on the hierarchy, but not necessarily with higher levels of proficiency.

There are 6 steps in the development of BARS for specific domains:

Step 1: Organize the data into dimensions based on the NJAS outcomes and the Panel of Experts' judgements.

Step 2: Scale the behaviors along a continuum on the basis of criteria such as complexity, level of details, and skill requirements.

Step 3: Develop full level descriptions based on behaviors defining a level.

Step 4: Identify the KSAs for each level description.

Step 5: Pilot level and KSAs descriptions.

Step 6: Validate the BARS.

The outcomes of the BARS will inform the development of the test blueprint for the assessment instruments.

Construction of the Test Blueprint

Based on the BARS, relative weightings of dimensions can be assessed for construction of a test blueprint. This is accomplished by standardizing the mean criticality ratings of the behaviors within a dimension to determine their overall relative weighting as compared to other dimensions. From these standardized weightings, ACT can determine the proportion of measures to be constructed within dimensions to ensure adequate representation in the assessment.

For example, a particular dimension may be divided into four level descriptions. Each level may contain five representative behaviors, established from the NJAS and the panel of expert's judgement. Based on the total criticality rating for all behaviors in the dimension, a percent weighting is calculated for each level description, reflecting the degree to which it is emphasized in the assessment.

IV. CHARACTERISTICS OF HIGH-PERFORMANCE WORKPLACES

Also covered under the scope of the NJAS is a concurrent project designed to identify the characteristics of high-performance workplaces. Business leaders, educators, and policymakers agree that high-performance business practices are a key element in the continued economic well-being of our country. But without empirical data on the characteristics of high-performance workplaces, organizations have little to guide them in making the changes necessary for creating a high-performance environment and succeeding in a global market.

To address this issue, the U.S. Department of Labor, Employment and Training Administration (ETA), and the U.S. Department of Education, National Center for Education Statistics (NCES), made funds available for a collaborative project to identify the key characteristics of high-performance work environments (HPWP). The project was conducted by American College Testing (ACT), the National Alliance of Business (NAB), and the U.S. Department of Labor Office of the American Workplace (OAW). A group of representatives from business, industry, and government identified a list of 36 characteristics they considered essential in their own definitions of high performance. This list was incorporated into an interview protocol that was administered to executives of 44 organizations (approximately half manufacturing and half service) considered to be high performance. The protocol asked executives to rate the 36 characteristics in terms of importance, and also to provide their own definitions of what high performance entailed in their own organizations.

Outcomes

From analysis of the importance ratings and key elements of the executives' own definitions, eight characteristics emerged that were considered most essential. These characteristics, which appeared in the top tiers of rankings but were not assigned a priority order, are:

Focus on quality -- The organization strives for continuous improvements in all processes, products, and services. Quality standards are built into product and service development and delivery systems.

Focus on customer satisfaction/input -- Customer feedback is valued and sought by the organization. Employees are focused on meeting customer needs. Customer recommendations about products or service improvements are incorporated into decisions made by the organization.

Flexible culture/openness to change -- The organization views change as positive. Changes often reflect a quick and deliberate response to feedback from customers and employees. The organizational culture builds and reinforces the recognition that change is essential to the organization's renewal and vitality.

Leadership with clear vision/commitment -- Organization leaders convey through sustained action a vision of the company's purpose and value. Leaders articulate their vision for the future and provide a climate that engages employees in contributing to the vision.

Training/continuous learning/education -- The organization invests in and actively supports training and continuous learning at all levels of the organization. Education through classroom and on-the-job instruction is ongoing. A culture that values employee development exists within the organization.

Information sharing -- Information is shared quickly in the organization through top-down and bottom-up channels and across organizational levels/divisions using integrated information systems and technologies. The organization shares information, and employees' ideas and concerns are communicated throughout the organization.

Profitability -- The organization makes increasingly more money over time. Public/not-for-profit organizations work within budget constraints by being below budget or providing greater services.

Productivity -- The organization is committed to achieving productive outcomes through work-output-per-resource allocations that capitalize on employee input and technologies.

Several of these characteristics also were mentioned most frequently in the definitions provided by the group of business, industry, and government representatives. Further research is needed to determine the significance of the differences between manufacturing and service organizations in rating the relative importance of particular high-performance characteristics.

Therefore, these results should not be considered definitive. Further research will continue to arrive at a comprehensive definition of high performance. Hopefully, that research will address several issues that emerged from this collaborative study, such as whether the eight top characteristics carry more weight in implementation or are simply more common and therefore mentioned more frequently; whether some

characteristics are seen as drivers of high performance and others as supportive; and whether there are patterns or styles of high performance in which various characteristics are more commonly combined for specific organizations.

The results of this collaborative project will be used to inform development of an instrument for measuring high performance, which will be administered in conjunction with the NJAS/BARS. In the future, organizations will be able to use the instrument to measure their own progress toward high performance.

The first step in this process will involve an extensive literature review of the high-performance area to generate ideas and gather information before the actual survey development process begins. Experts in the field of high-performance (i.e., business, government, and academia) will then be consulted. Their task will be to elaborate on the 36 high-performance characteristics identified by ACT researchers in the above collaborative project and the literature review. Once the content domains have been determined, ACT will consult with experts to generate survey items. This final survey will be administered to the same organizations that complete the NJAS/BARS instruments. The results of the HPWP survey will be used to identify the characteristics associated with high-performance workplaces and to relate those to the results of the NJAS/BARS instrument data in these organizations.

V. ASSESSMENT DEVELOPMENT AND PILOT TESTING

Assessment instruments are the final products of the NJAS. ACT will conduct a thorough electronic literature search and review to develop or choose workplace assessments based on the results of the NJAS/BARS. This literature analysis will include the traditional assessment literature. It will also include making contact with experts in the assessment field. This direct contact with experts will facilitate discovering new and emerging types of assessments that have not been published in the traditional assessment literature. Additionally, ACT researchers will conduct site visits to gather information about new and innovative types of assessment that are currently being used. These steps will help ACT establish communication between test development experts, and other professionals in the area so that the most current, valid, reliable, and cost effective assessments will be chosen or developed. To the extent that valid and reliable assessments are currently available, time and test development costs will be saved.

The results of the literature analysis, telephone contacts, and site visits will form the preliminary basis for recommendations to the Departments of Labor and Education about assessment format and techniques. A panel of experts for the assessment phase of the project will review the recommendations prior to beginning assessment development.

Assessment development begins with the creation of a test blueprint based on the results of the NJAS/BARS process. The blueprint will determine what percentage of items will be developed for each content domain.

Once the test blueprint is established, ACT will proceed with item development. The finalized draft items will then be pilot-tested and submitted to the Departments of Labor and Education for review and approval, and after any revisions are made, an Office of Management and Budget (OMB) clearance package will be submitted.

The steps in the assessment development process will begin with the identification of the type of items that would best estimate a person's level on each of the BARS instruments. The identification of item types will use the assessment literature analysis, ACT's experience in developing workplace assessments, and the combined experiences of the members of ACT's review committees. The next step will be to train item writers to write assessment items to measure each of the levels of the BARS. Once developed, the items will be edited and reviewed by content and testing experts. At this point, the items will be piloted by administering them to selected individuals. ACT will then interview those individuals to assess their understanding of the intent and content of what was being measured. Once reviewed and piloted, the items will be prepared for a large-scale field test and eventual external release.

VI. EXPANDED USES OF THE INFORMATION FROM THE NJAS

The NJAS was initiated for the purpose of developing assessments. However, once the complete study is validated and evaluated, the NJAS information will be valuable to a number of other public and private initiatives whose goal is to equip American workers with the skills they and their organizations need to successfully compete. The common language of the NJAS/BARS makes it possible to compare and cluster occupations into broader areas and to develop profiles of the requisite behaviors, knowledge, skills, and abilities. These profiles can be used to facilitate worker transitions from one job to another, and to infuse workplace context into the K-12 educational system so that students successfully make the transition from school to work. These elements are the building blocks for an integrated system that prepares workers for challenging jobs in high-performance environments and for the lifelong learning those jobs require.

Occupational Clusters and Skill Profiles

One problem with occupational information to date has been the specificity of the language used to describe job content. In many cases, this information is only meaningful to the occupations described within a particular industry context. The lack of a standardized language not only makes it difficult to compare occupations across industry contexts, but it impedes efforts to train people in more general occupational areas and to help people make the sometimes necessary transitions from one occupation to another. The NJAS/BARS, with its common language across occupations and its emphasis on behaviors, knowledge, skills, and abilities, provides the mechanism for identifying similarities and differences among occupations across industries. This capability makes it possible to develop profiles of occupations or occupational clusters that include generalized work behaviors, specific job skills, and standards of performance.

The clustering and profiling process begins with the proficiency levels and associated KSA's for the BARS developed from the behaviors in the NJAS taxonomy. Once proficiency levels and associated KSA's are established, it will be possible to begin developing skill profiles based on the behaviors and identified levels of proficiency required for various occupations and occupational areas. The skill profiles can be augmented by existing job-specific information so that they include both generalizable cross-occupational and occupation-specific information.

In a sense, the descriptors will identify standards (in terms of levels) for each occupation or occupational cluster. Across industries, differences in the behaviors and KSA's of similar profiles can be noted. Further determinations can then ascertain whether the differences are due to the context/industry in which the occupation is performed or to true occupational differences. This will make it clear which behavior

and KSA's transfer across contexts and which are context-specific. The same applies to profiles within industries. Once skill profiles are determined, it will be possible to identify the common and unique elements that make up the profiles within industry contexts.

School-to-Work

To better ensure that this nation's economy is competitive in the future, the behaviors, knowledge, skills, and abilities (KSAs) that are most important for workers must be strengthened within the workforce. The first step in this direction is to identify where the most important behaviors and KSAs are being learned. The context for identifying the sources of learning will come from the BARS level descriptions containing the behaviors and KSAs in terms of where they are first learned and how they are effectively developed. This information will assist in identifying the most effective sites for learning the contents and exploring ways to better design efficient and effective work-related training and education programs.

Identifying the sources of learning will rely on consultation with several business and industry trainers and teachers from various educational institutions. Through their involvement from both sides of the issues, their analysis and feedback on the proficiency levels associated with the BARS can help determine where the behaviors and KSAs are being taught and evaluated. Further discussions will ascertain possible changes to instruction/curricula and to the assessment process to ensure a greater level of skill transfer.

The skill profile clustering system from the NJAS/BARS will also have direct relevance to school-to-work and work-to-work transitions. Through its use of a common language and implications for skill profile development and occupational classification, the NJAS/BARS can in fact link these initiatives into one system.

The primary focus of the curricula development system must be to identify behaviors and KSA's that can be taught and used to guide the progress of young people and adults into meaningful and productive work. Typically, educators have taught very discrete types of skills that, although critical to learning and future job success, do not always transfer directly to the work context. To make this connection more direct, the NJAS/BARS system will describe profiles of behaviors, tasks, and KSA's at increasing levels of specificity, enabling teachers to discuss the workplace skills that every student needs upon leaving school, entering into training within general occupational clusters, or entering into occupations within specific industries. When students begin to make this logical progression in a real work setting, they can

build upon the levels and standards learned in the school. By maintaining the link between the general and specific behaviors/tasks and KSA's, students can begin to make transitions in efficient and predictable ways. They have learned the required elements not only at the specific job level, but also at levels more readily transferable to new learning and job contexts.

Work-to-Work

Because jobs change and people change jobs, the built-in linkages between the general behaviors and KSA's and their more job-specific counterparts can also allow easy transition from job to job. The ability to match a worker's current repertoire of behaviors and KSA's to those required for available or desired jobs greatly aids the worker's re-employment and the transition to a better job. Workers who meet the standards for other occupations can be placed in new jobs, and those who do not can be directed to appropriate training programs.

The common language and organizational structure of the NJAS/BARS system offers the vehicle needed to match workers to jobs and to required job training. This information can form the basis for a labor market information system that matches workers to available jobs and to training programs. The result would be a matrix of occupational profiles linked using a common language to a current labor market database which can successfully match applicants to available jobs with similar profiles, highlight similarities over broad occuaptional categories, or indicate specific training to enhance the applicant's chances of a job match.

A Comprehensive System

The common language provided by the NJAS/BARS system can link the school-to-work and the work-to-work initiatives into a single, comprehensive workforce learning system. This strategy unites the educational system (K-12) with the work context by infusing the clusters of behaviors and KSA's identified by the NJAS into school curricula. The common language of the NJAS/BARS connects occupations and occupational areas across and within industries to ensure certification and a high school diploma. Workers who meet the performance standards for an occupational area will be able to move from one industry to another because the behaviors and KSA's that are common across the clusters are known. Attainment of these transferable skills will increase the probability that the job of choice will be in a context best suited to the person's skill profile.

This comprehensive strategy empowers learners with a profile of behaviors and KSA's necessary for entry into the workplace—specifically, high-performance environments—and for life-long learning in the work context.

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